

OCCURRENCE OF *LIMONIA* (*GERANOMYIA*) *COMMUNIS* (DIPTERA: TIPULIDAE) IN A MAMMOTH HOT SPRING, WYOMING¹

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ABSTRACT: *Limonia* (*Geranomyia*) *communis* is recorded for the first time from a thermal environment. This represents the first tipulid among 51 dipterous species collected from thermal habitats in the continental United States.

A 1972 survey of the literature concerning insects inhabiting hot springs in the continental United States (Bartow, 1972) and subsequent research (Barnby, 1987; Resh, 1984) has to date identified 50 species of Diptera but includes no records of tipulid species inhabiting thermal waters. While a Seasonal Park Ranger Naturalist at Yellowstone National Park in 1970, I had the opportunity to survey the insects inhabiting hot springs in the Mammoth Hot Springs region of the park. During the survey one tipulid pupa and one pupal case were taken from the face of Orange Mound Spring and were subsequently identified as *Limonia* (*Geranomyia*) *communis* (Osten Sacken). G. W. Byers (1977, personal communication) indicated that, although tipulids have been collected from moist runoff areas surrounding hot springs (he collected *L. (G.) ibis* (Alexander) from algae in warm water on a thermal-water fountain at Hot Springs National Park, Arkansas), none have definitely been associated with a hot spring or thermal gradient for breeding. To my knowledge, this collection represents the first published record of association of tipulids with a hot spring habitat in the United States.

The habitat consists of a thin sheet of water slowly flowing over the nearly vertical surface of the hot spring formation (primarily travertine limestone) the surface of which is roughened by the irregular deposition of minerals from the hot spring. The micro-habitat consists of "mini-shelves" of mineral deposition which trap minute pools of water (>1 mm in depth) from which the pupa and pupal case were collected. The collection site is consistent with the habitat of the subgenus described by Pennak (1953) as being "On cliffs or rock faces, in or beneath algal scum with percolating or flowing water..." The temperature of the water at this location was 27.2°C (79°F), whereas it was 60.6°C (141°F) at the source of the spring. As the specimens were collected at a temperature lower than

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30°C., the temperature limit to which accumulated precipitation may be heated naturally by sunlight in desert areas (Brues, 1928) and therefore the lower threshold of the thermal environment, this species may be classified as a sub-thermal form. However, as only two specimens were collected from this location, and the normal habitats of species of *Limonia* (*Geranomyia*) and of this species are in cooler waters, one should refer to the temperature of collection as in its upper range of tolerance rather than the maximum temperature that the species can tolerate (Lutz, 1931). Additional collections may determine that the upper thermal tolerance of *Limonia* (*Geranomyia*) *communis* is within the true thermal habitats hot springs create.

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